DYWIDAG-SYSTEMS INTERNATIONAL

POWER SET Self-Drilling Friction Bolt

ALWAG SYSTEMS

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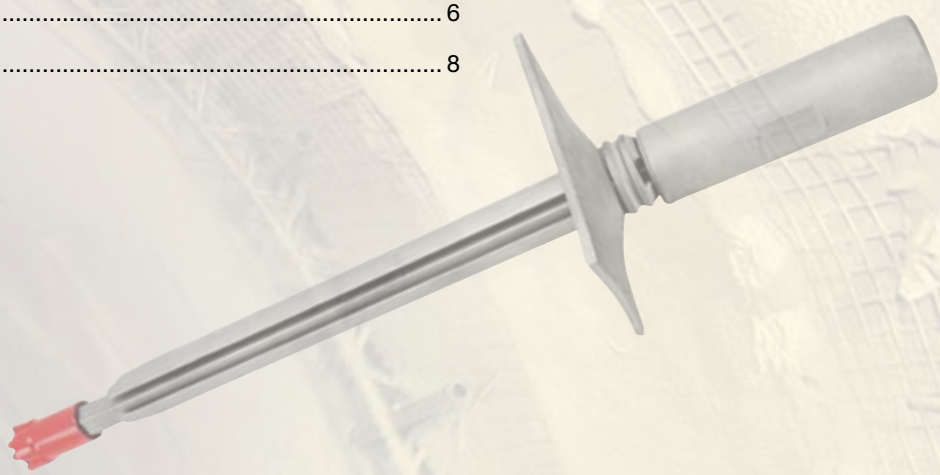


Introduction

The POWER SET Friction Bolt is a self-drilling reinforcement element used for ground control in Mining and Tunneling. In addition, the POWER SET rock bolt system is deployed for rock fall and rock slide protection.

This patented one-step POWER SET rock bolt system stands for a safe and easy installation as well as immediate load-bearing capacity after installation. Another feature is the flexibility of the POWER SET Self-Drilling in regard to changing rock conditions.

Optional installation of an expansion element features additional mechanical anchorage up to the ultimate load of the friction bolt tube. A specially developed automation unit for six bolts per installation sequence allows safe and state-of-the-art rock bolt installation.

Fields of Application

Tunneling and Mining

- Systematic reinforcement of underground excavations
- Rock bolting in remote or areas that are difficult to access
- Additional rock reinforcement
- Face anchoring

Civil Engineering

- Rock fall and rock slide protection
- Anchorage of avalanche barriers

Main Advantages

- Simultaneous drilling and installation
- Installation using standard drilling machinery
- Immediate load-bearing capacity after installation
- Direct load transfer over the entire bolt length
- Ability to maintain load-bearing capacity even when undergoing large deformations
- High shear strength
- Safe, easy, and fast installation procedure
- Trouble-free application under unstable borehole conditions
- No injection or grouting necessary
- Ergonomic and safety-related advantages for the workforce

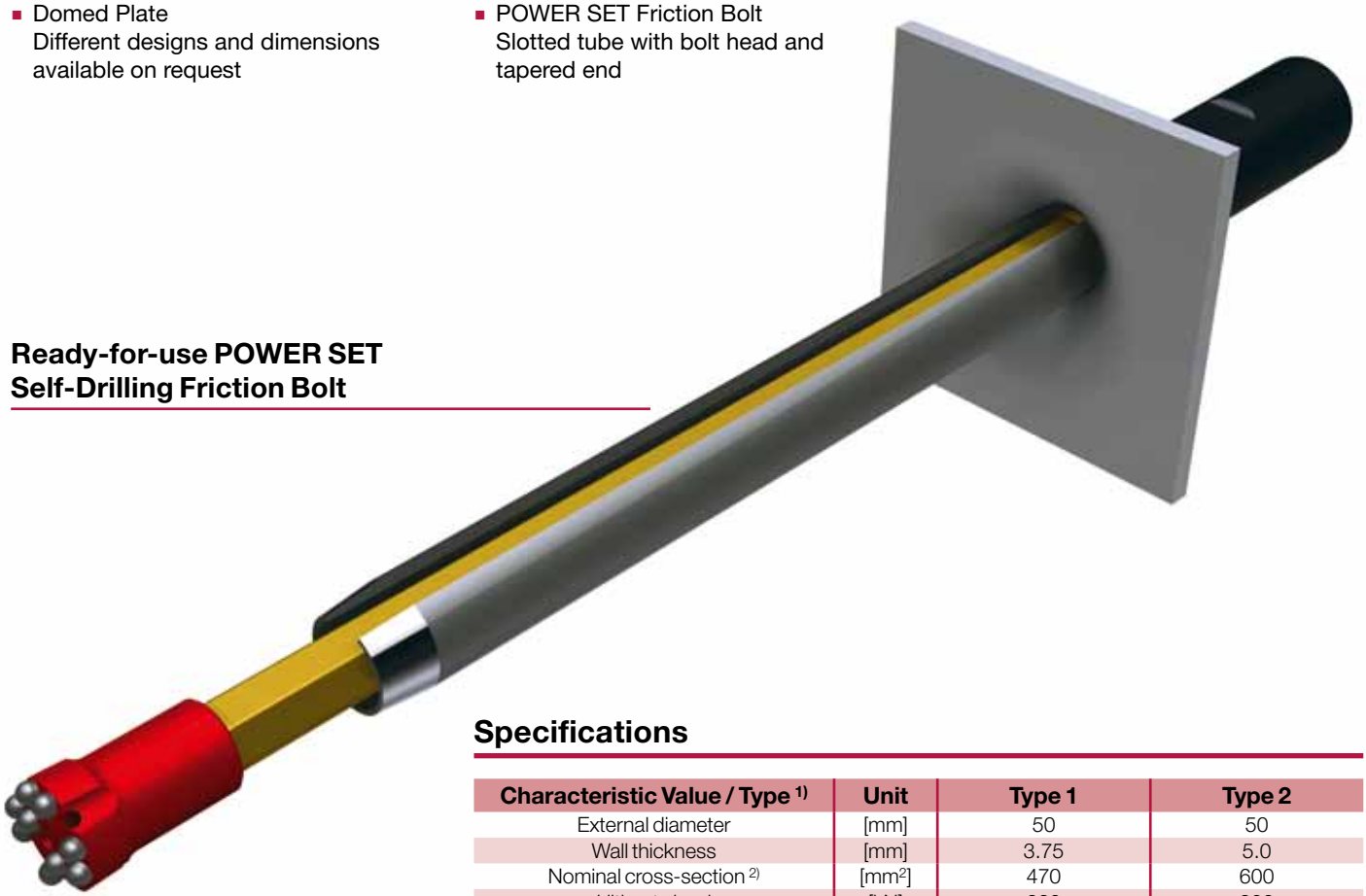
System Description

- Improved self-drilling friction bolt
- Frictional load transfer between bolt and borehole
- Application for rock bolting in remote areas or in case of unstable roof conditions
- Installation with standard rotary-percussive rock drilling equipment: controlled transfer of impact energy onto the friction bolt
- Optional installation of an expansion element: increase of the load bearing capacity up to the ultimate load of the friction bolt tube
- Temporary corrosion protection by increased friction bolt wall thickness
- Non-sensitive to nearby blasting works

System Components

- POWER SET Drill Bit
  Single-use drill bit in different designs and dimensions available
- POWER SET Drill Rod
  Special drill steel for optimum service life
- POWER SET Adapter
  Controlled transfer of the impact energy onto the friction bolt

- Domed Plate
  Different designs and dimensions available on request
- POWER SET Friction Bolt
  Slotted tube with bolt head and tapered end



Ready-for-use POWER SET Self-Drilling Friction Bolt

Specifications

Characteristic Value / Type [1]	Unit	Type 1	Type 2
External diameter	[mm]	50	50
Wall thickness	[mm]	3.75	5.0
Nominal cross-section [2]	[mm²]	470	600
Ultimate load	[kN]	330	300
Ultimate strength [3]	[N/mm²]	700	500
Guiding value shear force [4]	[kN]	370 - 470	360 - 420
Delivery length [5]	[m]	1 - 4	
Article No. [6]	[–]	204515031XXX	204515051XXX

1) Status: 2012-06, note: all values are subject to change ; 2) Rounded
3) Calculated from the characteristic load value and nominal cross-section, rounded
4) In-situ value for installed rock bolts ; 5) Customized lengths are available on request
6) "XXX" ... Friction bolt length [m] /10

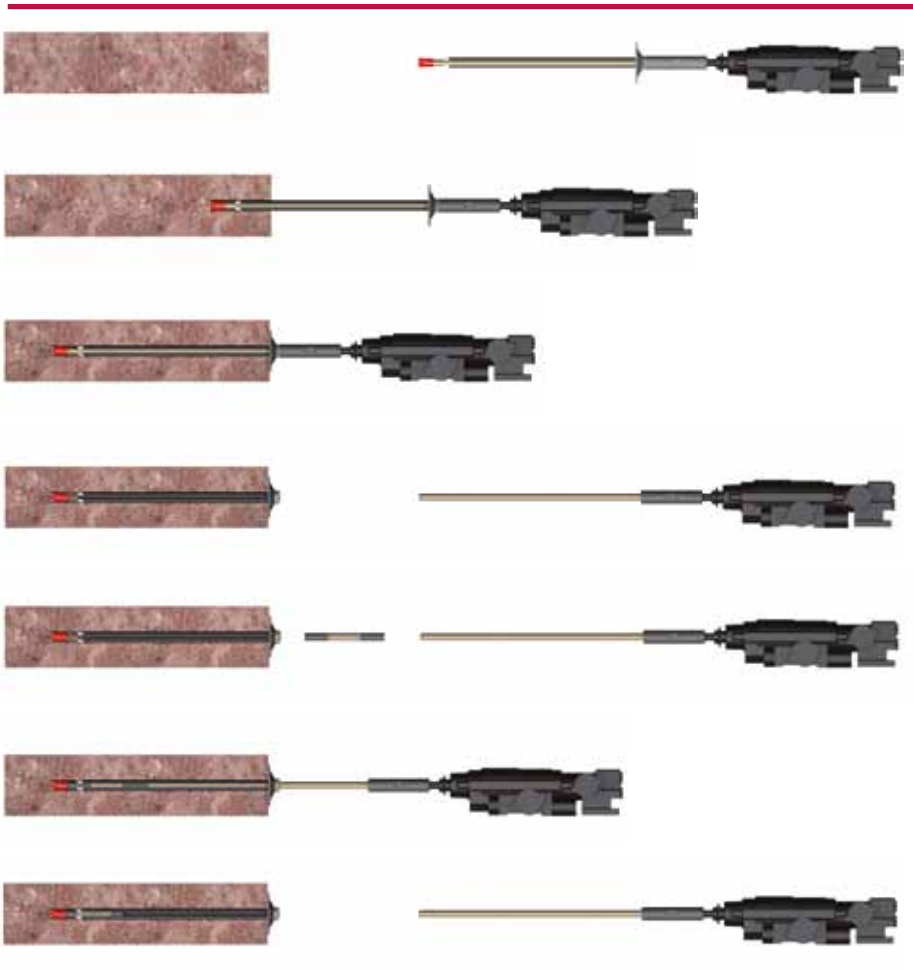
POWER SET Drill Bits

- Tuned to rock mass conditions and ground control applications
- Different drill bit diameters allow an optimum on-site adaption
- Cross or button drill bit design
- Hardened or carbide insert version available
- Diameter colour code
  - 47.5 RED
  - 48.5 YELLOW
  - 49.5 BLUE

Article No.	Description	Article Code	Design		
	("XX" ... Diameter Ø [mm])			48.5	49.5
2045801110XX	Cross drill bit, hardened	PSB-HEX28-0XX-HD			
2045801210XX	Cross drill bit, with carbide inserts	PSC-HEX28-0XX-HM		X	X
2045802110XX	Button drill bit, hardened	PSB-HEX28-0XX-HD			
2045802210XX	Button drill bit, with carbide inserts	PSB-HEX28-0XX-HM		X	X
2045802410XX	Arc-shaped drill bit, hardened	PSA-HEX28-0XX-HD			
2045804210XX	Arc-shaped drill bit, with carbide inserts	PSA-HEX28-0XX-HM			

1) X-marked fields indicate standard drill bit types, other dimensions available on request

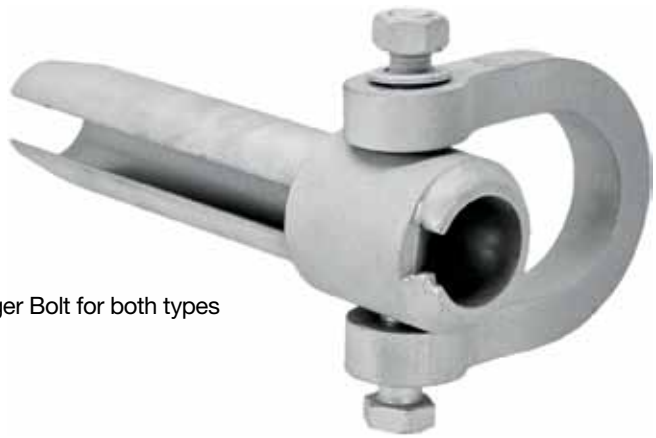
Installation Procedure



1. Assembly POWER SET Self-Drilling Friction Bolt and connection of the adapter to the rock drill
2. Rotary-percussive self-drilling installation with a single-use drill bit; back-flushing of the cuttings through the annulus between drill steel and friction bolt
3. Completion of installation after the final drilling depth has been reached
4. Retraction of the POWER SET drill rod from the installed friction bolt – the single-use drill bit remains inside
5. Optional installation of an expansion element
6. Mechanical anchorage of the POWER SET friction bolt by enlargement of the expansion element using hammer strokes of the rock drill
7. Retraction of the POWER SET drill steel

Accessories

- POWER SET pull test kit



- POWER SET Hanger Bolt for both types

Order Information

Article Description		Article No.
POWER SET SD Friction Bolt	Type 1: PS50-330, L= X,X00 [mm]; "XX" ... Length	204515035XX0
POWER SET SD Friction Bolt	Type 2: PS50-300, L= X,X00 [mm]; "XX" ... Length	204515055XX0
POWER SET SD Friction Bolt	Type 2: Expansion element, PS50-300	204520011001
POWER SET SD Hanger Bolt	Type 2: PS50-300-HB, L= 4,000 [mm]	204515052400
POWER SET SD Hanger Bolt	PS-HB Shackle	204530053001
POWER SET SD Hanger Bolt	PS-HB Head Bolt	204530054001
POWER SET SD Friction Bolt	Drill Rod, HEX28-T38 x Y,Y00 [mm]; "YY" ... Length	204550011YY0
POWER SET SD Friction Bolt	PS-Adapter T38F-T38Fx200 [mm]	204550021020
POWER SET SD Friction Bolt	PS-Adapter R38F-T38Fx200 [mm]	204550022020
POWER SET SD Friction Bolt	PS-Adapter T38F-T38Fx400 [mm]	204550021040
POWER SET SD Friction Bolt	PS-Adapter R38F-T38Fx400 [mm]	204550022040
POWER SET SD Friction Bolt	PS-Adapter R51M-T38Fx800 [mm]	204550023089
POWER SET SD Friction Bolt	PS-Adapter T38F-T38Fx600 [mm]	204550021060
POWER SET SD Friction Bolt	PS-Adapter R38F-T38Fx600 [mm]	204550022060

POWER SET Automation Unit

The POWER SET Automation Unit is used for the fully automated installation of the POWER SET Self-Drilling Friction Bolt. This independent boom unit can be attached to underground drilling or continuous Mining machines; alternatively, it can be mounted onto support frames.

Featuring a bolt magazine, fully automated installation of six POWER SET Self-Drilling Friction Bolts per bolt operation cycle can be achieved. The combination of a friction bolt with optional additional point end anchorage and remote-controlled installation is ideal for bolting under difficult and unstable ground conditions.

Main Advantages

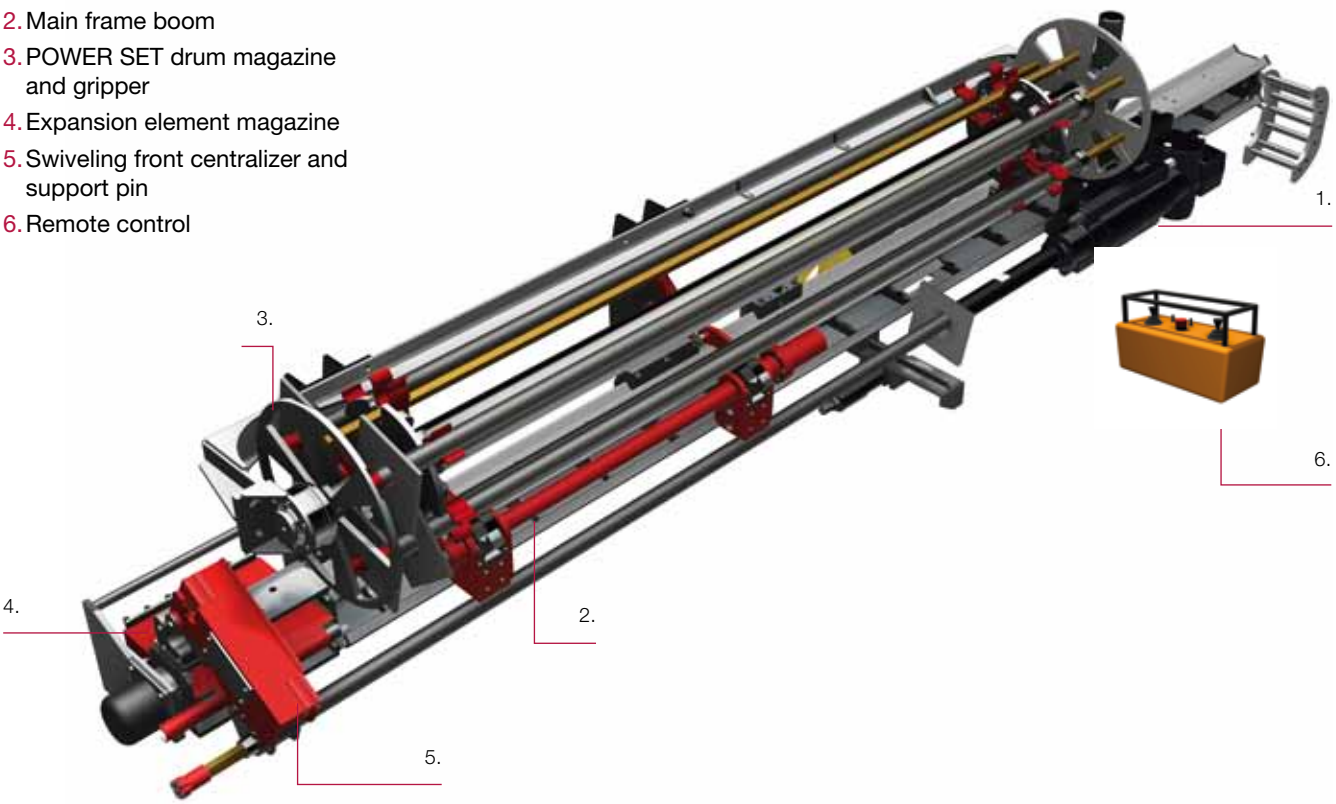
- Fast and safe installation of the POWER SET Self-Drilling Friction Bolt
- Fully remote-controlled and automated installation
- Tough design for underground Mining applications
- No personnel has to be present in unsupported areas
- Easy and similar operating principle using standard personnel and on-site drilling machinery
- Proven installation procedure under difficult ground conditions

System Description

- Rock bolt automation for the installation of the POWER SET Self-Drilling Friction Bolt
- Independent boom unit for underground drilling or continuous Mining machines
- Rock bolt drum magazine with space for up to six fully preassembled POWER SET Self-Drilling Friction Bolt units plus drill steel
- Self-Drilling bolt installation and additional fixation of an expansion element - (see installation procedure)
- For all standard bolt lengths up to 2.5 [m]; special lengths available on request
- Customer-specific hydraulic rock drills
- ATEX conform version available on request

Assembly

1. Hydraulic hammer and carriage
2. Main frame boom
3. POWER SET drum magazine and gripper
4. Expansion element magazine
5. Swiveling front centralizer and support pin
6. Remote control

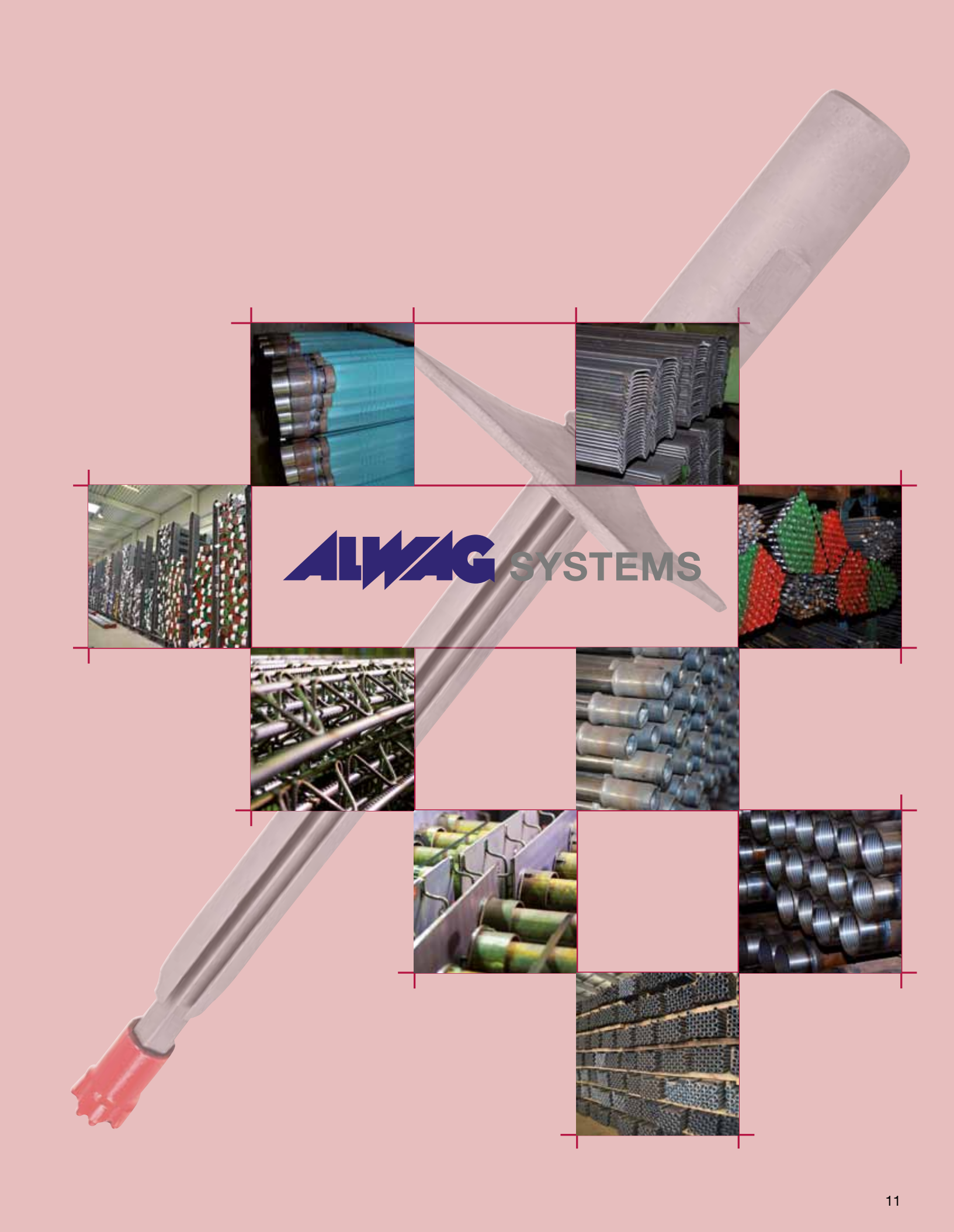


Specifications

Characteristics	Unit	Value	Notes
Dimensions	[m]	app. 1 x 1 x 5	W x H x L
Weight	[kg]	app. 1,500	without bolts
Hydraulic supply requirements	[L/min]	20	at app. 170 [bar]
Electric supply requirements	[V]	24	DC

Further References

- Assembly instructions
- Operation and service manual, hydraulic and electric plans
- Spare parts list
- POWER SET Self-Drilling Friction bolt user manual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